

# INTERNATIONAL SEARCH REPORT

ational application No.  
PCT/DK2005/000048

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9,18

Refers to a method to produce a lightning diverter comprising a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material, as well as a blade for a wind turbine equipped with a lightning diverter strip produced according to the method claimed in claims 1-9.

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2. claims: 10-17

lightning diverter comprising a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material, where said segments are described by concave shapes

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# INTERNATIONAL SEARCH REPORT

International Application No  
PC 1 / vK2005/000048

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H01Q1/42 B64D45/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F03D B64D B29C H01Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 583 702 A (BALDWIN ET AL) 22 April 1986 (1986-04-22) the whole document	1-9
A	US 4 506 311 A (CLINE ET AL) 19 March 1985 (1985-03-19) cited in the application	1-9, 18
X	the whole document	10, 11, 16
A		12-15, 17
A	WO 01/77527 A (JOMITEK APS; JOHANSEN, OLUF, PETER, KAAD; SOERENSEN, TROELS) 18 October 2001 (2001-10-18)	1-9, 18
A	page 9, line 24 - page 10, line 17; claims 4, 8, 18	15-17
	----- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*Z\* document member of the same patent family

Date of the actual completion of the international search

6 July 2005

Date of mailing of the international search report

27. 07. 2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel: (+31-70) 340-2040, Tx: 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Frias Rebelo, A

# INTERNATIONAL SEARCH REPORT

Inter national Application No  
PC1/UK2005/000048

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 237 514 A (CLINE ET AL) 2 December 1980 (1980-12-02)	8,9
A	column 2, line 40 - line 49; figures 2,3 -----	15-17
X	US 3 416 027 A (AMASON MYRON P ET AL) 10 December 1968 (1968-12-10)	10,11,16
A	column 3, line 24 - column 6, line 37; claims 1,3-6; figures 2,3 -----	12-15
A	US 4 796 153 A (AMASON ET AL) 3 January 1989 (1989-01-03) column 6, line 22 - column 7, line 32; figures 1-3 -----	10-17

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/DK2005/000048

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4583702	A	22-04-1986	DE 3344364 A1 FR 2537788 A1 GB 2132027 A ,B	14-06-1984 15-06-1984 27-06-1984
US 4506311	A	19-03-1985	NONE	
WO 0177527	A	18-10-2001	AU 4828301 A WO 0177527 A1 EP 1272759 A1 US 2004130842 A1	23-10-2001 18-10-2001 08-01-2003 08-07-2004
US 4237514	A	02-12-1980	NONE	
US 3416027	A	10-12-1968	NONE	
US 4796153	A	03-01-1989	NONE	

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference  P 2003 01887 WO1	<b>FOR FURTHER ACTION</b>  see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No.  PCT/DK2005/000048	International filing date (day/month/year)  24/01/2005	(Earliest) Priority Date (day/month/year)  23/01/2004
Applicant  LM GLASFIBER A/S		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☒ **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 2

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/DK2005/000048

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
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## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9,18

Refers to a method to produce a lightning diverter comprising a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material, as well as a blade for a wind turbine equipped with a lightning diverter strip produced according to the method claimed in claims 1-9.

---

2. claims: 10-17

lightning diverter comprising a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material, where said segments are described by concave shapes

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/DK2005/000048

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H01Q1/42 B64D45/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F03D B64D B29C H01Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 4 506 311 A (CLINE ET AL) 19 March 1985 (1985-03-19) cited in the application the whole document -----	1-9, 18
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents:

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\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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\*Z\* document member of the same patent family

Date of the actual completion of the international search

6 July 2005

Date of mailing of the international search report

27. 07. 2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040. Tx. 31 651 epo nl.  
Fax: (+31-70) 340-3016

Authorized officer

Frias Rebelo, A

## INTERNATIONAL SEARCH REPORT.

International Application No  
PCT/DK2005/000048

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/DK2005/000048

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4583702	A	22-04-1986	DE 3344364 A1 FR 2537788 A1 GB 2132027 A , B	14-06-1984 15-06-1984 27-06-1984
US 4506311	A	19-03-1985	NONE	
WO 0177527	A	18-10-2001	AU 4828301 A WO 0177527 A1 EP 1272759 A1 US 2004130842 A1	23-10-2001 18-10-2001 08-01-2003 08-07-2004
US 4237514	A	02-12-1980	NONE	
US 3416027	A	10-12-1968	NONE	
US 4796153	A	03-01-1989	NONE	

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

## PCT

To:

see form PCT/ISA/220

### WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/DK2005/000048

International filing date (day/month/year)  
24.01.2005

Priority date (day/month/year)  
23.01.2004

International Patent Classification (IPC) or both national classification and IPC  
H01Q1/42, B64D45/02

Applicant  
LM GLASFIBER A/S

#### 1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

#### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

#### 3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized Officer

Frias Rebelo, A

Telephone No. +49 89 2399-7451



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/DK2005/000048

---

**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/DK2005/000048

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**Box No. IV Lack of unity of invention**

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1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
- ☒ paid additional fees.
  - ☐ paid additional fees under protest.
  - ☐ not paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
  - ☒ not complied with for the following reasons:  
**see separate sheet**
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
  - ☐ the parts relating to claims Nos.

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**Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-9,18, 12-15
	No: Claims	10,11,16
Inventive step (IS)	Yes: Claims	1-9,14,18
	No: Claims	12,13,15,17
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	

2. Citations and explanations

**see separate sheet**

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING  
AUTHORITY (SEPARATE SHEET)

International application No.

PCT/DK2005/000048

Re Item IV.

1. The present application does not meet the requirement of Unity (Rule 13.1 PCT) for the following reasons:

1.1 The following separate groups of inventions are found for the present application:

- Claims 1-9,18 which refer to a method to produce a lightning diverter comprising a layer of electrically non-conductive materia with a plurality of isolated segments of electrically conductive material, as well as a blade for a wind turbine equipped with a lighthning diverter strip produced according to the method claimed in claims 1-9.
- Claims 10-17, which refer to a lightning diverter comprising a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material, where said segments are described by concave shapes

1.2 The common subject-matter of the present application refers to the problem of providing an improved lighting diverter to be placed on structures such as wings on wind turbines, aircraft components, radomes, etc, where the lightning diverter comprises a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material.

The devices mentioned above as well as the problem addressed therewith are known in the prior art, which is also acknowledged by the applicant - see e.g. US 4506311.

1.3 Further to the paragraph above, the special technical features, in the sense of Rule 13.2 PCT, intended to define a contribution of the present application over the prior art are:

- According to claim 1, a method of producing a lightning diverter comprising the steps of: (a) making a plurality of holes in a plate of an electrically conductive material; (b) filling said holes, at least partially with one or more electrically conductive materials; (b) dividing the plate thereby obtaining a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material.

- According to claim 10 by a lightning diverter where the segments of conductive material are described by concave shapes.

1.4 Under these circumstances it must be stated that the following groups of inventions are not so linked as to form a single general inventive concept.

- The method of claim 1 and the appended dependent claims 2-9, as well the blade turbine of claim 18 due its dependence on claims 1-9;
- The lightning diverter of claim 10 and the appended dependent claims 11-17

**Re Item V.**

1. Reference is made to the following documents:

D1: US-A-4 583 702 (BALDWIN ET AL) 22 April 1986 (1986-04-22)

D2: US-A-4 506 311 (CLINE ET AL) 19 March 1985 (1985-03-19) *A-X*

D3: WO 01/77527 A (JOMITEK APS; JOHANSEN, OLUF, PETER, KAAD;  
SOERENSEN, TROELS) 18 October 2001 (2001-10-18)

D4: US-A-4 237 514 (CLINE ET AL) 2 December 1980 (1980-12-02)

D5: US-A-3 416 027 (AMASON ET AL) 10 December 1968 (1968-12-10)

In the following paragraphs, reference is made to the first invention, i.e. to the method of independent claim 1 and the appended dependent claims 2-9, as well the blade turbine of dependent claim 18.

2. The method of claim 1 fulfils the requirements of Article 33 (2) and (3) PCT regarding novelty and inventive step. The reasons are as follows:

2.1 Document D1, which is considered to represent the most relevant state of the art, (the references in parentheses applying to this document) implicitly discloses a method for producing a lightning diverter comprising the step of forming a plurality of holes in a aluminium foil in the form of a strip (see e.g. fig.2, 3; column 1, lines 26 to 30).

The method of producing a lightning diverter of independent claim 1 differs from the



one known from D1 in that it further comprises the steps of  
(b) filling said holes, at least partially with one or more electrically conductive materials;  
(c) dividing the plate thereby obtaining a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material.

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT)

- 2.2 The problem to be solved by the method of claim 1 may be regarded as to provide method for producing an improved lightning diverter. With said method, a lightning arrested with improved mechanical properties (e.g. stiffness, resistance to failure) and durability is obtained.

Other pertinent prior art does not disclose or render obvious the additional method steps recited in claim 1. D2 discloses a method of producing a lightning diverter strip where a plurality of isolated segments of electrically conductive material are fixed on the layer of a non-conductive material; D3 makes reference to the addition of an adhesive layer attached to a copper lightning diverter and the use of such diverters in wind turbines; D4 refers to a lightning diverter strip including a base or substrate formed of polyester tape having a surface adapted to be applied directly to the aircraft component to be protected, and bonded thereto by suitable epoxy.

Therefore, the method of claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT).

3. Claims 2-9, 18 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step (Article 33(3) and (2) PCT).

In the following paragraphs, reference is made to the second invention, i.e. to the lightning diverter of independent claim 10 and the appended dependent claims 11-17.

4. The lightning diverter of independent claim 10 does not meet the requirements of Article 33 (2) PCT regarding novelty. The reasons are as follows:
- 4.1 D5 discloses a lightning diverter strip for conducting a lightning-induced electrical current for e.g. a radome (see e.g. fig.3, column 5, lines 16 to 49), where the diverter comprises a layer of electrically non-conductive material (e.g. 34) of e.g. neoprene, which embeds therein a series of spaced metallic wired segments (e.g. 38), where the embedded metallic wired segments are described by concave shapes, e.g. along the lower embedded portions of the wire segments contacting the layer of electrically non-conductive material.

Therefore, no difference can be found between the claimed lightning diverter and the one known from D5.

5. A lightning diverter comprising a combination features of independent claim 10 with the features of dependent claim 14 is not disclosed or rendered obvious by available prior art documents.

Such a lightning diverter would therefore fulfil the requirements of Article 33 (2) and (3) PCT regarding novelty and inventive step.



# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 2003 O1887 WO1	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/DK2005/000048	International filing date (day/month/year) 24.01.2005	Priority date (day/month/year) 23.01.2004	
International Patent Classification (IPC) or national classification and IPC INV. H01 Q1/42 B64D45/02			
Applicant LM GLASFIBER A/S et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 9 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> sent to the applicant and to the International Bureau a total of sheets, as follows:</p> <p style="margin-left: 20px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 20px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input checked="" type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  21.11.2005		Date of completion of this report  03.04.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer  Frias Rebelo, A  Telephone No. +49 89 2399-7451 	

International application No.  
PCT/DK2005/000048

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
    - ☐ international search (under Rules 12.3 and 23.1(b))
    - ☐ publication of the international application (under Rule 12.4)
    - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

1-15 filed with telefax on 21.11.2005

1-18 filed with telefax on 21.11.2005

17-77 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/DK2005/000048

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**Box No. IV Lack of unity of invention**

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1. ☐ In response to the invitation to restrict or pay additional fees, the applicant has:
- ☐ restricted the claims.
  - ☐ paid additional fees.
  - ☐ paid additional fees under protest.
  - ☐ neither restricted nor paid additional fees.
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.
  - ☒ not complied with for the following reasons:  
**see separate sheet**
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
  - ☐ the parts relating to claims Nos. .

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-18
	No: Claims	
Inventive step (IS)	Yes: Claims	1-18
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

**Re Item IV**

**Lack of Unity of the Invention**

1. The present application does not meet the requirement of Unity (Rule 13.1 PCT) for the following reasons:

1.1 The following separate groups of inventions are found for the present application:

- Claims 1-9,18 which refer to a method to produce a lightning diverter comprising a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material, as well as a blade for a wind turbine equipped with a lightning diverter strip produced according to the method claimed in claims 1-9.
- Claims 10-17, which refer to a lightning diverter comprising a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material, where the exposed parts of said segments are described by concave shapes

1.2 The common subject-matter of the present application refers to the problem of providing an improved lightning diverter to be placed on structures such as wings on wind turbines, aircraft components, radomes, etc, where the lightning diverter comprises a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material.

The devices mentioned above as well as the problem addressed therewith are known in the prior art - see e.g. US 4506311-, which is also acknowledged by the applicant (see e.g. description, page 3, lines 6-8)

1.3 Further to the paragraph above, the special technical features, in the sense of Rule 13.2 PCT, intended to define a contribution of the present application over the prior art are:

- According to claim 1, a method of producing a lightning diverter comprising the steps of: (a) making a plurality of holes in a plate of an electrically conductive material; (b) filling said holes, at least partially with one or more electrically conductive

materials; (b) dividing the plate thereby obtaining a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material.

- According to claim 10 by a lightning diverter where the exposed parts of the segments of conductive material are described by concave shapes.

1.4 Under these circumstances it must be stated that the following groups of inventions are not so linked as to form a single general inventive concept.

- The method of claim 1 and the appended dependent claims 2-9, as well the blade turbine of claim 18 due its dependence on claims 1-9;
- The lightning diverter of claim 10 and the appended dependent claims 11-17

**Re Item V.**

**Reasoned Statement with regard to Novelty, Inventive Step or Industrial Applicability.**

1. Independent claim 10 is clear (Article 6 PCT) in view of the arguments stated by the applicant with letter dated 16.03.2006.

From the above, it also follows that dependent claims 11-17 are clear (Article 6 PCT).

2. In the following, reference is made to the following documents:

- D1: US-A-4 583 702 (BALDWIN ET AL) 22 April 1986 (1986-04-22)
- D2: US-A-4 506 311 (CLINE ET AL) 19 March 1985 (1985-03-19)
- D3: WO 01/77527 A (JOMITEK APS; JOHANSEN, OLUF, PETER, KAAD; SOERENSEN, TROELS) 18 October 2001 (2001-10-18)
- D4: US-A-4 237 514 (CLINE ET AL) 2 December 1980 (1980-12-02)
- D5: US-A-3 416 027 (AMASON ET AL) 10 December 1968 (1968-12-10)

In paragraph 3. below, reference is made to the first invention, i.e. to the method of independent claim 1 and the appended dependent claims 2-9, as well the blade turbine of dependent claim 18.

3. The method of claim 1 fulfils the requirements of Article 33 (2), (3) and (4) PCT regarding novelty, inventive step and industrial applicability. The reasons are as follows:

- 3.1 Document D1, which is considered to represent the most relevant state of the art for the subject-matter of claim 1, (the references in parentheses applying to this document) implicitly discloses a method for producing a lightning diverter comprising the step of forming a plurality of holes in a aluminium foil in the form of a strip (see e.g. fig.2, 3; column 1, lines 26 to 30).

The method of producing a lightning diverter of independent claim 1 differs from the one known from D1 in that it further comprises the steps of

- (a) filling said holes, at least partially with one or more electrically conductive materials;
- (b) dividing the plate thereby obtaining a layer of electrically non-conductive material with a plurality of isolated segments of electrically conductive material.

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT)

- 3.2 The problem to be solved by the method of claim 1 may be regarded as to provide method for producing an improved lightning diverter. With said method, a lightning arrester with improved mechanical properties (e.g. stiffness, resistance to failure) and durability is obtained.

Other pertinent prior art does not disclose or render obvious the additional method steps (a) and (b) as mentioned above. D2 discloses a method of producing a lightning diverter strip where a plurality of isolated segments of electrically conductive material are fixed on the layer of a non-conductive material; D3 makes reference to



the addition of an adhesive layer attached to a copper lightning diverter and the use of such diverters in wind turbines; D4 refers to a lightening diverter strip including a base or substrate formed of polyester tape having a surface adapted to be applied directly to the aircraft component to be protected, and bonded thereto by suitable epoxy.

Therefore, the method of claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT).

- 3.3 The method of claim 1 is used for producing a lightning diverter that can be placed on structures such as e.g. wings on wind turbines, aircraft components or radomes.

Therefore the method of claim 1 is considered to be industrially applicable (Article 33(4) PCT).

- 3.4 Claims 2-9, 18 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty, inventive step and industrial applicability (Article 33(2), (3) and (4) PCT).

In paragraphs 4. below, reference is made to the second invention, i.e. to the lightning diverter of independent claim 10 and the appended dependent claims 11-17.

4. The lightning diverter of claim 10 fulfils the requirements of Article 33 (2), (3) and (4) PCT regarding novelty, inventive step and industrial applicability. The reasons are as follows:

- 4.1 Document D2, which is considered to represent the most relevant state of the art for the subject-matter of claim 10 (the references in parentheses applying to this document), discloses a lightning diverter strip for conducting a lightning-induced electrical current and to be placed on structures such as e.g. aircraft radomes with the purpose of lightning protection, where the diverter comprises a base of di-electric material (e.g. based on a epoxy resin matrix) provided with e.g. diamond-shaped

conducting segments arranged longitudinally on the strip in space apart relation ( see e.g figure 1; column 3, line 16-29 )

The lightning diverter of independent claim 10 differs from the one known from D2 in that

- the exposed parts of said segments are described by concave shapes.

The subject-matter of claim 10 is therefore novel (Article 33(2) PCT).

- 4.2 The problem to be solved by the subject-matter of claim 10 may be regarded as to provide a lightning diverter with, e.g., an improved design that exhibits e.g. improved properties and performance. In an lightning diverter of claim 10, the conductive segments have a better connectivity and attachment to the surrounding non-conductive material, thereby ensuring improved operation stability and life-time behaviour of the diverter.

Other pertinent prior art does not disclose or render obvious a diverter where the exposed parts of said segments are described by concave shapes. D5 discloses different designs of diverter strips for radomes for lightning protection such as: strips with button-shaped segments rivetted along the centerline of the strip; or diverter strips with several layers of materials in which segments of metallic wire are embedded so that their ends are exposed at certain intervals. In both cases, the exposed parts of the conducting material are described by non-concave shapes.

Therefore, the lightning diverter of claim 10 of the present application is considered as involving an inventive step (Article 33(3) PCT).

- 4.3 The lightning diverter of claim 10 can be placed on structures such as e.g. wings on wind turbines, aircraft components or radomes, hence preventing detrimental effects related e.g. with lightening strokes.

Therefore the lightning diverter of claim 10 is considered to be industrially applicable (Article 33(4) PCT).

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- 4.4 Claims 11-17 are dependent on claim 10 and as such also meet the requirements of the PCT with respect to novelty, inventive step and industrial applicability (Article 33(2),(3) and (4) PCT).

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